WHAT IS CLAIMED IS:

1. A method of characterizing mass unbalance in a tire, said method comprising the following steps:

establishing a plurality of tire parameters for a given tire;

rotating the given tire at respective first and second rotational speeds and obtaining first and second sets of radial run out measurements;

decomposing said first and second sets of radial run out measurements into multiple respective harmonics;

calculating mass uneven distribution coefficients from the decomposed radial run out measurements; and

determining the size and location of any mass unbalance existent in the given tire.

2. A method as in claim 1, wherein at least one of said first and second rotational speeds corresponds to at least about 600 rotations per minute.

3. A method as in claim 2, wherein one of said first and second rotational speeds corresponds to a low speed less than about 180 rotations per minute.

4. A method as in claim 1, wherein both of said first and second rotational speeds corresponds to at least about 600 rotations per minute, and wherein said first and second rotational speeds are different from one another, and wherein said method further comprises the steps of rotating the given tire at a low speed less than about 180 rotations per minute, obtaining a third set of radial run out measurements, and decomposing the third set of radial run out measurements into multiple respective harmonics.

5. A method as in claim 4, further comprising the steps of:

calculating radial stiffness variation coefficients from the decomposed radial run out measurements; and

determining the size and location of any radial stiffness variation existent in the given tire.

6. A method as in claim 1, wherein the plurality of tire parameters in said establishing step are selected from the group consisting of tire radius, tire mass, tire inflation pressure, tire width, tire radial stiffness, tire tangential stiffness, tire bending stiffness and tire extensional stiffness.

7. A method as in claim 1, wherein said step of determining the size and location of any mass unbalance existent in the tire includes determination of any mass uneven distribution and point masses existent in the provided tire.

8. A method as in claim 1, further comprising a step after said determining step of grading or sorting the given tire into one of at least two categories established by predetermined mass unbalance limitations.

9. A method of characterizing high speed uniformity of a tire, said method comprising the following steps:

providing a manufactured tire characterized by a plurality of layers;

rotating the manufactured tire at a first predetermined rotational speed and obtaining at least one first force measurement;

rotating the manufactured tire at a second predetermined rotational speed and obtaining at least one radial run out measurement; and

determining from said at least one first force measurement and said at least one radial run out measurement the effect of layer overlap or variation for each of the plurality of layers in the manufactured tire on the overall tire high speed uniformity.

10. A method as in claim 9, wherein said second predetermined rotational speed corresponds to at least about 600 rotations per minute.

11. A method as in claim 9, wherein said first rotational speed corresponds to less than about 180 rotations per minute.

12. A method as in claim 9, wherein said at least one first force measurement is selected from the group consisting of effective rolling radius, radial force, and radial run out.

13. A method as in claim 9, further comprising the steps of:

rotating the given tire at a third predetermined rotational speed and obtaining at least one second force measurement, wherein said third predetermined rotational speed corresponds to at least about 600 rotations per minute; and

decomposing the at least one second force measurement into multiple harmonics.

14. A method as in claim 13, further comprising the step of determining complex transfer functions from said at least one first and second force measurements, and said at least one radial run out measurement, and wherein said step of determining layer overlap or variation also takes into account such complex transfer functions.

15. A method as in claim 14, further comprising a step of determining tire high speed uniformity characteristics for the given tire from the at least one first force measurement, the at least one radial run out measurement, and the complex transfer functions.

16. A method as in claim 9, further comprising the step of grading or sorting the given tire into one of at least two categories established by predetermined high speed uniformity limitations.

17. A method of manufacturing tires, comprising the following steps:

constructing at least one tire;

establishing a plurality of tire parameters for said at least one tire;

obtaining radial run out measurements for said at least one tire for at least one predetermined rotational speed;

calculating parameters for any mass unbalance existing in said at least one tire;

performing a comparison of the mass unbalance calculations to established mass unbalance limitations; and

controlling manufacture of subsequent tires responsive to the comparison in said performing step.

18. A method as in claim 17, wherein the plurality of tire parameters in said establishing step are selected from the group consisting of tire radius, tire mass, tire inflation pressure, tire width, tire radial stiffness, tire tangential stiffness, tire bending stiffness, and tire extensional stiffness.

19. A method as in claim 17, wherein radial run out measurements are obtained at a low speed less than about 180 rotations per minute and at a first predetermined rotational speed of at least about 600 rotations per minute.

20. A method as in claim 17, wherein radial run out measurements are obtained at a low speed less than about 180 rotations per minute and at first and second different predetermined rotational speeds each characterized by a rotational speed of at least about 600 rotations per minute.

21. A method as in claim 17, wherein said step of calculating any mass unbalance existing in said at least one tire comprises the steps of:

decomposing radial run out measurements from said obtaining step into multiple respective harmonics;

calculating mass uneven distribution coefficients for multiple harmonics; and

determining from said mass uneven distribution coefficients the size and location of any mass unbalance existent in said at least one tire.

22. A method as in claim 21, wherein said step of determining the size and location of any mass unbalance existent in the at least one tire includes determination of any mass uneven distribution and point masses existent in the provided tire.

23. A method as in claim 17, wherein the mass unbalance limitations of said performing step are established by a vehicle sensitivity test.

24. A method as in claim 17, further comprising the step of grinding or adding extra mass to the at least one tire to reduce levels of mass unbalance identified in the at least one tire.

25. A method of manufacturing tires, comprising the following steps:

establishing complex transfer functions associated with tire characterization;

constructing a set of production tires;

rotating each production tire at a first predetermined rotational speed and obtaining at least one first force measurement;

rotating each production tire at at least second and third rotational speeds, obtaining at least one radial run out measurement at each of the at least second and third rotational speeds, and calculating any mass unbalance associated with each production tire;

calculating high speed uniformity characteristics of each production tire based on said at least one first force measurement, the complex transfer functions from said establishing step, and the calculated mass unbalance; and

controlling manufacture of subsequent tires responsive to the high speed uniformity characteristics in said calculating step.

26. A method as in claim 25, further comprising the step of establishing a plurality of tire parameters for said set of production tires, wherein said plurality of tire parameters are utilized in calculation of the mass unbalance for each production tire.

27. A method as in claim 26, wherein the plurality of tire parameters in said establishing step are selected from the group consisting of tire radius, tire mass, tire inflation pressure, tire width, tire radial stiffness, tire tangential stiffness, tire bending stiffness, and tire extensional stiffness.

28. A method as in claim 25, wherein said first rotational speed is less than 180 rotations per minute and wherein said second and third rotational speeds are at least about 600 rotations per minute.

29. A method as in claim 25, wherein said method of manufacturing tires further comprises the step of obtaining at least one radial run out measurement at a low speed less than about 180 rotations per minute for contributing to the mass unbalance calculation of each production tire.

30. A method as in claim 25, wherein said step of controlling manufacture of subsequent tires comprises providing tolerance settings and predetermined locations for each layer overlap or variation in the subsequent tires.

31. A method as in claim 25, further comprising the step of performing a comparison of the high speed uniformity characteristics from said calculating step to established high speed uniformity limitations.

32. A method as in claim 31, wherein the high speed uniformity limitations of said performing step are established by a vehicle sensitivity test.

33. A method as in claim 25, further comprising the step of grinding or adding extra mass to the respective production tires to improve high speed uniformity characteristics calculated for each production tire.

34. A method as in claim 25, wherein said step of establishing complex transfer functions comprises:

constructing a set of sample tires;

rotating each sample tire at said first predetermined rotational speed and obtaining at least one first sample tire force measurement;

rotating each sample tire at said second predetermined rotational speed and obtaining at least one second sample tire force measurement;

rotating each sample tire at at least said second and third rotational speeds and obtaining at least one radial run out measurement at each of the at least said second and third rotational speeds; and

determining complex transfer functions from the at least one first force measurement, the at least one second force measurement, and the radial run out measurements obtained at the at least second and third rotational speeds.

35. A method as in claim 34, further comprising the steps of calculating any mass unbalance associated with each sample tire, and wherein said step of determining complex transfer functions takes into account the calculated mass unbalance.

36. A method as in claim 34, further comprising the step of decomposing the at least one fifth force measurement into multiple harmonics.